Economic tradeoffs of citrus greening management

By Allen Morris and Ron Muraro

INTRODUCTION

Huanglongbing, or greening, was discovered in Brazil in 2004 and in Florida in 2005. Since being detected in the Homestead area, greening has rapidly spread northward in Florida, and now infects more than 30 citrus-producing counties. Significant research efforts are being devoted to finding and implementing strategies to minimize and control the spread of greening. An initial goal of greening control strategy is to remain in production following a management program that leads to greatest long-term profitability until better controls are discovered. This article explores the profitability of various types of control measures now being practiced in the citrus industry.

CONTROLLING THE SPREAD OF GREENING

Recent experience in Brazil has shown that if greening is detected early enough and control practices are followed diligently, groves can remain productive with disease incidence at low levels. The key is early detection, followed by effective control practices. In Brazil, after three years of intensive spraying, scouting and aggressive removal of infected trees, the rate of infection in some of the best managed groves is below 1 percent.

Researchers, as well as growers, who have field experience working with greening agree that whatever level of infection is determined by grove scouting, the true incidence is likely twice that or more because of asymptomatic trees.

Most Florida citrus growers who have found greening in their groves believe that they waited too late to start looking for it. Thus, they are having difficulty getting it under control. The problem of monitoring and management is that the disease may be present but the trees are asymptomatic. Researchers, as well as growers, who have field experience working with greening agree that whatever level of infection is determined by grove scouting, the true incidence is likely twice that or more because of asymptomatic trees.

Greening control strategies vary among citrus growers. Some growers don't believe that greening is a serious threat, or still are not well-informed about it, or have not implemented any kind of disease management program. Some know they have greening, but rather than manage the disease, they plan to "milk" the profits remaining in the grove, then replant or sell the land. Other growers believe that because their neighbor doesn't manage greening, their efforts are futile and decide to reap the profits remaining in their grove rather than destroy currently high yielding trees. Then there are other growers who scout from the ground and remove infected trees, but not aggressively.

The remainder — mostly large growers — are aggressively following integrated practices to manage greening. These include scouting and identification of infected trees from the ground and from elevated platforms for taller trees four times a year; prompt removal of infected trees; applying systemic insecticides such as Temik for mature trees and Admire for young trees; and spraying with foliar insecticides at least five times a year. Three of these sprays would be in addition to the grove's regular spray program. If high psyllid populations are observed, additional sprays would be needed. In Florida, the optimum number of spray applications and the level of tree loss that can be consistently achieved has not been determined. In well-managed Brazilian groves, young trees are sprayed up to 24 times a year and mature trees 12 times a year.

EVALUATING THE COST OF GREENING MANAGEMENT PRACTICES

For this economic analysis, production costs were updated to estimate costs to implement greening management practices. Scouting and spraying to control psyllids was estimated to increase costs of caring for a mature Florida orange grove from $911 to $1,289 per acre — an increase of 41 percent, or $378. Pick, load and haul costs were estimated at $2.52 per box while nursery trees were $8.25 each.

Three scenarios were analyzed:

1) No control of greening representing the standard for comparison;

2) resetting versus no resetting; and

3) replanting to a higher versus medium density grove.

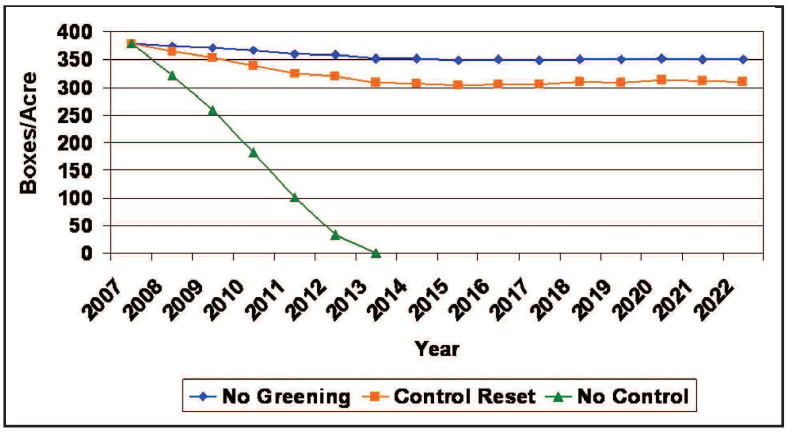

Figure 1. Greening Control vs. No Control: Typical GroveGrove

The economic performance of the alternatives in the first two scenarios was analyzed by comparing the present values of net revenues among the alternatives under two price scenarios: $1.25 and $1.50 per pound solids. Present value enables comparing different future income streams among alternatives on an equivalent financial basis. A 12 percent discount rate was used, which is in the range of rates investors are using to evaluate alternative citrus investments. Return on investment under the same prices was used for comparing replanted higher density versus medium density groves.

The grove used for the analyses was a mature flatwoods Valencia grove. For groves where greening was being controlled, it was assumed that attrition rates due to greening increased 150 percent, 100 percent, and 75 percent over normal attrition for trees aged 1-3, 4-11, and 12 years old and older, respectively. Based on the age distribution of trees in the grove used in the analysis, this resulted in a weighted average attrition rate from greening of 2.3 percent.

The no-control scenario assumes an average mature flatwoods grove producing 379 boxes per acre before greening is discovered. Once it is found, nothing is done to control greening, but normal caretaking activities are continued. Box yield

Table 1. Financial Analysis of Valencia Orange Grove No Control vs. Greening Control

Tree Density: 145 TPA (12' x 25')				
Pre-Greening Boxes/Acre (Average Valencia Grove): 379				
	No Control Rapid Decline		Control with Resetting	
Price/P.S.	$1.25	$1.50	$1.25	$1.50
Present Value	$2,065	$4,324	$5,129	$10,430
Note: For no control, greening losses begin in second year. Grove no longer producing after 5 years.				

Table 2. Financial Analysis of Valencia Orange Grove with Greening Control Resetting vs. No Resetting

Tree Density: 145 TPA (12' x 25')				
Pre-Greening Above Average Valencia Grove Boxes Per Acre: 476				
	Reset		No Reset	
Price/P.S.	$1.25	$1.50	$1.25	$1.50
Present Value	$9,746	$16,350	$9,024	$14,479
Reset Program: 100% of trees lost annually reset every other year for trees 1-10 years old. 50% of trees lost annually are reset every other year for trees 11-15 years old.				

declines rapidly and the grove is no longer covering costs in three or four years, depending on prices (Figure 1). These rates of attrition were similar to those observed in Brazil in groves where no control was undertaken.

The no-control scenario was then compared to the same average grove where psyllids were being controlled and removed trees were being reset. The resetting program consists of resetting 100 percent of attrition for 1- to 10-year-old trees and 50 percent of attrition for 11- to 15-year-old trees. Even with the costs of scouting, spraying and tree removal, managing greening was almost twice as valuable as not controlling it at $1.25 lb solids and 2.4 times as valuable at $1.50 (Table 1).

The reset versus no-reset scenario assumes a more productive mature Flatwoods grove, yielding 476 boxes per acre before greening is discovered. The reset program is the same as that for the average grove. The present values of the reset versus no-reset scenarios are close, but resetting does show an economic advantage over not resetting, particularly at higher lb solid prices (Table 2). If reset trees survive to become productive, the analysis indicates the grove will produce a sustained income stream and doesn't have to be completely replanted at some future date.

Once a grove becomes economically unproductive, it is assumed that it will be totally replanted. Returns on investment were compared for replanted groves of three different densities: 145 trees per acre (TPA), 207 TPA and 270 TPA (Table 3). Data for the higher density groves are based on historical data from commercial plantings of Valencias on Swingle in Hendry County (207 TPA) and Valencias on Rusk in Polk County (270 TPA). Groves were reset only through year four, to examine the financial performance of higher density groves if resets can't survive in a mature grove. The investment for replanting included tree removal, land preparation, re-establishment and/or modification of the irrigation system, and costs for trees and planting. A price for land was not included in the investment because it was assumed that the land was already owned.

Yields per tree are lower for the higher-density groves but greater per acre, averaging 593 (270 TPA) and 512 (207 TPA) boxes per acre for the high-density groves in the mature (8-15) years versus 388 boxes per acre for the medium-density grove. The medium-density grove showed returns on the $4,951 investment in infrastructure of only 6.8 percent at $1.25 and 11.7 percent at $1.50. The best financial performance was exhibited by the highest-density grove (270 TPA). It showed returns of 11.8 percent and 16.1 percent on the $6,533 investment in infrastructure at lb solid prices of $1.25 and 1.50, respectively. Thus, the added yields for the higher density (270 TPA) more than offset the added investment in trees and planting, and was important in maximizing net revenues with tree attrition from greening.

CONCLUSIONS

Experience in Brazil has shown that an aggressive greening management program of scouting and identification, prompt tree removal and spraying to control psyllids can keep tree loss rates to economically acceptable levels. The decision not to control greening not only compromises the effectiveness of neighboring growers who have implemented disease management practices, but it's the least profitable strategy in an environment of greening. Moreover, experience in Brazil has shown that diligent control efforts will enable

Table 3. Financial Performance of Replanted Valencia Grove: Medium vs. High Density Grove Without Resetting

Tree Density	145 TPA (12' x 25')		207 TPA (8.75' x 24')		270 TPA (8' x 20')	
Yield Avg. in Years 8-15 of Grove	388 BX/Ac		512 BX/Ac		593 BX/Ac	
Investment Per Net Acre W/O Land	$4,951		$5,463		$6,533	
Price/P.S.	$1.25	$1.50	$1.25	$1.50	$1.25	$1.50
ROI	6.8%	11.7%	10.7%	15.1%	11.8%	16.1%
Reset Program: 100% of trees lost annually reset every other year through year 4.						

surviving a neighbor not controlling greening for a period of time, and with time, the neighbor will be out of business, industry supplies will be lower and prices potentially higher, rewarding the diligent control efforts.

If trees can be obtained and resets grown to maturity in a mature grove with greening management, resetting is the preferred strategy. If not, when the grove becomes unproductive, replanting to a higher tree density provides added returns to offset higher costs from tree attrition and greening management. For additional information, you can contact the authors or go to www.crec.ifas.ufl. edu/Extension/Economics.

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